Programme Project Report (PPR)

for

Distance Learning Programme under School of Distance Education

Post Graduate Diploma in Food Safety Management and Regulations (PGDFSMR)

Course Co-ordinator: Dr.Jisha M.S

Academic support by

National Institute Of Plant Science Technology (NIPST)

Mahatma Gandhi University

Kottayam, Kerala

POST GRADUATE DIPLOMA IN FOOD SAFETY MANAGEMENT AND REGULATIONS (PGDFSMR)

(Distance Learning Programme–Diploma Programme)

Programme Project Report

Mahatma Gandhi University started the School of Distance Education in 1989 with the vision of providing the opportunity for quality education to all realms of society. Since the beginning, thousands of students have availed themselves of this opportunity for higher education to a great extent throughout Kerala. Many students outside the State have also benefited from this. But after the new directions of the UGC in 2014, the University had stopped all the Off-Campus Centres of the School of Distance Education both inside and outside the State.

Now it is the new endeavour of the School to revamp its functioning by offering different types of Diploma and Certificate programmes very relevant to contemporary society, in addition to the conventional Graduate and Post Graduate programmes. This is being done with the academic and infrastructural support of the eminent Schools and Interdisciplinary Interuniversity Centres of the University. All these Schools/ Centres have already conducted similar Programmes or Post Graduate Programmes in the same area. This Post Graduate Diploma Programme has been designed by the National Institute of Plant Science Technology and to be conducted by the School of Distance Education with the academic support of the School.

National Institute of Plant Science Technology (NIPST), an Inter-School centre of Mahatma Gandhi University. The course established on 20th August 2014. The Institute enrolling students through competitive examinations at the National level in the campus of Mahatma Gandhi University for advanced education in plant science, promoting research in Interdisciplinary areas of 'Plants and their Environment Relations' towards developing 'Plant-based Eco-technologies'.

The Institute will inspire students to apply their creative talents to research potentials of the rich botanical wealth of Kerala in the development of globally significant technologies useful in sustainable agricultural, phyto-medicinal, bio-fuel, bio-based industrial and eco-remediation purposes. Instead of keeping science and technology as watertight compartments in conventional programmes, this institute will enable science students to end up their post graduation to a productive research on plant-based eco-technology and entrepreneurship based

on the technology that they develop. Overall, the Institute aims at boosting entrepreneurship in the country through productive research in plant science.

a) Programme's mission & Objectives :

The Food Safety and Standards Act, 2006 which is a consolidating statute related to food safety and regulation in India. FSSAI is responsible for protecting and promoting public health through the regulation and supervision of food safety. Now Food Safety Regulations in India has reached global standards with the introduction of Food Safety and Standards Act 2006. With this, requirement of adequately trained manpower to be a part of Food Safety Quality Assurance and Regulatory Systems has increased immensely. With the enormous expansion of food sector and customer awareness, safety and quality assurance has become a very vital hitch to be addressed in the current decade. This has opened an enormous job opportunities for adequately trained human resource in the area.

b) Relevance of the programme with HEI's Mission Goals :

Mahatma Gandhi University has started one year PG Diploma in Food Quality and Safety Management in view of making enormous opportunities in the food science & technology sector. The P.G Diploma programme is intended to prepare food scientists, food engineers, microbiologists and others with appropriate scientific backgrounds for active job opportunities in food safety and quality assurance, monitoring and certification process in the food industry and in the Government.

c) Nature of prospective target group of learners:

Candidates who have passed B.Sc/M.Sc in Food Science and Nutrition/ Food Science and Technology/ Biotechnology/ Biochemistry/ Microbiology or B.Tech./M.Tech. in Food Technology/ Biotechnology/ Life sciences.

d) Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence:

The course provides an outline of State-Of-Art theoretical information and practical experience, directly and indirectly related to a better understanding of food safety problems, their origin and solutions. The programme is framed for transmission of both knowledge and know-how of local importance and global significance to the students.

e) Instructional design:

The programme is of 1 year duration comprising eight courses with a total of 32 credits. There are adequate contact classes and the assessment involves both internal as well as external components. Each student has to submit a report based case studies or project.

	(Course Co-ordinator: Dr.Jisha M.S)						
	Duration-1 Year						
Course Code	Course Type	Course Name	Contact Sessions (hours)	Credits	*Internal Marks	External Marks	Total Marks
PGDFSMR 101	Core course	Fundamentals of food quality	12	4	20	80	100
PGDFSMR 102	Core course	Food laws and standards	12	4	20	80	100
PGDFSMR 103	Core course	Principles of food safety and quality management	12	4	20	80	100
PGDFSMR 104	Core course	Quality assurance in food laboratories	12	4	20	80	100
PGDFSMR 105	Core course	Food safety and quality management systems	12	4	20	80	100
PGDFSMR 106	Core course	Chemical and Microbiological safety of foods	12	4	20	80	100
PGDFSMR 107	Core course	Food safety and quality auditing (practicals)	60	2	20	80	100
PGDFSMR 108	Project report	Case study/ Project work and Report		6	20	80	100
Total			132	32	160	640	800

*Through assignments

f) Procedure for admission, curriculum transaction and evaluation:

Eligibility: Candidates who have passed B.Sc/M.Sc in Food Science and Nutrition/ Food Science and Technology/ Biotechnology/ Biochemistry/ Microbiology or B.Tech./M.Tech. in Food Technology/ Biotechnology/ Life sciences are eligible for admission.

Admission to the programme will be done by the University through a common procedure for all the programmes under the School of Distance Education. Fee structure will be decided by the University. The School will prepare an academic calendar/activity planner and will be circulated among all the learners at the time of admission itself. The academic calendar will include all the significant activities, important dates, schedule of submission of assignments, schedule of contact classes, schedule of examinations, etc.

Evaluation of the courses shall be done by the faculty themselves on the basis of internal assessment and end semester examinations. 20% of the marks will be decided by the internal evaluations and the remaining 80% by the end semester examinations which will be done by the University. The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

Each student shall be required to do one Assignment/Book Review/Debate/Seminar/Presentation of case study for each course. Assignments/Book Review after valuation shall be returned to the students. The teacher shall define the expected quality of the above in terms of structure, content, presentation and the like, and inform the same to the students.

Grading System will be followed for the evaluation on a ten point scale. The details of the grading system are given in the following Table.

Percentage Equivalence of Grade:

Range of % of Marks	**Grade Letter**	**Performance**	**Grade Point**
95 - ≤ 100	O	Outstanding	10
85 - < 95	A plus	Excellent	9
75 - < 85	A only	Very Good	8
65 - < 75	B plus	Good	7
55 - < 65	B only	Above Average	6
45 - < 55	C	Average	5
40 - < 45	P	Pass	4
< 40	F	Fail	0
Absent	Ab	Absent	0

'P' grade is required for a minimum pass in a course. The minimum GPA required for a pass in the Certificate programme is 4.

Calculation of Grade Point Average (GPA) :

Credit Points for the Course = (No. of Credits assigned for the course **x** Grade Point secured for that course).

GPA indicates the performance of a student in the programme. GPA is based on the total **credit points** earned by a student in all the courses divided by the total number of credits assigned to the courses required in the programme.

Note: GPA is computed only if the candidate passes in all the required courses (gets a minimum required grade for a pass in all the required courses as per the curriculum).

GPA =

Total credit points earned by the student from all the required courses of the programme
Total credits of all courses required in the programme

This formula shall be printed on the Grade Card issued to the student with a note that it could be used to convert the grades into mark-percentages. (The details of the grading system as indicated above shall also be printed on the Grade Card).

Conversion of GPA to Grade

GPA	Grade
10	O
9.0 - < 10	A plus
8.0 - < 9	A only
7.0 - < 8	B plus
6.0 - < 7	B only
5.0 - < 6	C
4.0 - < 5	P
< 4	F
Absent	Ab

Conversion of GPA to percentage

Equivalent Percentage = (GPA obtained) X 10

g) Requirement of the laboratory support and library resources:

The library and infrastructure support of the Centre and the University will be extended to the learners as per the requirement.

Mahatma Gandhi University Library and Information System consists of University Library, libraries of the Schools and 4 study centre Libraries. The University Library was established in 1989. The University Library which is situated in the main campus occupies purpose-built accommodation, and provides a variety of facilities and has a user-friendly environment. These include individual work spaces, room for group study and teaching, audio-visual access and online information retrieval system. The building of the University Library is 2000 sq.m in area consisting of the cellar, the ground floor and the first floor.

Academic as well as public users are given the facility to use the library. Special category membership is provided to journalists. The library is providing service from 8 am to 8 pm in three shift timings for its staff. The library functions on an average of 345 days in a year. The libraries of teaching departments are open during working hours of the Schools. Reading space is provided in all the three floors housing the various sections of the library. The library provides reading facility to the visually impaired users too. For this, an electronic lab custom made for visually and physically challenged users has been set up during 2016.

The University Library has a Library Advisory Committee. It is an 18 member committee with Vice-Chancellor as Chairman and University Librarian as Convener.

The library has a collection of 59,000 books, 232 journals, 2,135 Ph.D. theses and has access to 15000+ e-journals under E-ShodhSindhu. The activities of the Library are comprehensively automated using open source library management software KOHA. OPAC, Journal Article Index, By monthly Bibliography compilation and Literature Search Service are also available

The library is a member of the INFLIBNET Centre, Ahmedabad as well as DELNET (Developing Library Network). As a member of these networks, the library provides access to the resources of other major libraries in the country. In addition to the access to UGC INFONET consortium, it has access to major online databases, such as EBSCO, ProQuest dissertations and theses, Oxford Scholarship Online, IEEE All Society Periodicals Package etc. Mahatma Gandhi University had won the State IT Award during the year 2009 in the e-learning category for its university online theses digital library. The various department libraries have a good collection of subject specific books and journals.

A. MAHATMA GANDHI UNIVERSITY LIBRARY	
Category	**No.**
Books	59000
Journals	232
Bound Journals	7500
Ph.D Theses	2135
E-Journals (in UGC-Infonet, renamed as E-ShodhSindhu)	15000
Online databases (in UGC Infonet)	11
Online Archives subscribed	185 Titles
Online databases subscribed	4
E-books	7338
DVDs: Educational Videos	**293**

B	**Name of School/Centre**	**Total No. of books**
	National Institute of Plant Science Technology (NIPST)	**420**

h) Cost estimate of the programme and the provisions:

Budget estimate (for 40 students)

S.No.	Item	Amount (Rs. in Lakhs)
1.	Manpower	6
2.	Study material	3.5
3.	Laboratory	5

4.	Internal assessment / Project	1.5
5	Examination &Evaluation	1.5
6.	Books and Periodicals	1.5
	Total	**19**

Total Programme fee: Rs.20000/-

i) Quality assurance mechanism and expected programme outcomes:

The quality of the programme will be ensured through strict monitoring by an executive committee including the Co-ordinator of the programme, the subject experts, Director, School of Distance Education and Head of the National Institute of Plant Science Technology. The Co-ordinator of the programme shall ensure the regular student feedback of courses, teachers and programme in the prescribed format towards the end of the semester and the same shall be analysed to draw conclusions for effecting improvement. Periodical review meetings on the programme efficacy will be held in which the remarks of teachers on curriculum, syllabi and methods of teaching and evaluation will be given due importance. Moreover, the progress and the quality of the programme will be monitored by the Internal Quality Assurance Cell of the University from the outcome and feedback of the learners as well as the proper documentation maintained in the Centre.

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SYLLABUS

POST GRADUATE DIPLOMA IN FOOD SAFETY MANAGEMENT AND REGULATIONS (PGDFSMR)

PGDFSMR101 : FUNDAMENTALS OF FOOD QUALITY

(4+0: Theory)

Part- 1 Food Sanitation and safety:

Factors contributing to physical, chemical and biological contamination in food chain, Prevention and control of food borne hazards, Definition and regulation of food sanitation, sources of contamination, personal hygiene-food handlers, cleaning compounds, sanitation methods, waste disposal strategy (solid and liquid waste) and pest control

Part- 2 Food adulteration:

Common adulterants, Simple tests for detection of adulteration, Food additives-classification, functional role and safety issues, types of adulteration and recent trends in food adulteration.

Part- 3 Food Safety and Quality Assurance:

Quality control of raw materials, in-process food control, Quality control of finished products

Part- 4 Food Quality Indices:

Meat and meat products, Fish and fish products, Milk and dairy products, Vegetables , fruits and their products, Grain , pulses and oil seeds, Coffee, tea and spices

Text books

- Early, R. (2006) Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
- Gould, W.A and Gould, R.W. (2005) Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
- Pomeraz, Y. and MeLoari, C.E. (2008) Food Analysis: Theory and Practice, CBS publishers and Distributor, New Delhi.

- Bryan, F.L. (2007) Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.
- Kirk, R.S and Sawyer, R. (2005) Pearson's Composition and Analysis of Foods, Longman Scientific and Technical. 9th Edition, England.
- FAO (2006) Manuals of Food Quality Control. 2-Additives Contaminants Techniques, Rome.

PGDFSMR102 : FOOD LAWS AND STANDARDS

(4+0: Theory)

Part- 1 History of food regulations in India:

Legislations- Prevention of Food Adulteration act 1954, Food product order (1955), Solvent Extracted Oil, De-oiled Meal and Edible Flour (Control) Order, 1967, Meat Food Products Order (1973), Edible Oils Packaging, 1998, Edible Oils Packaging, 1998, Vegetable Oil Products Order, 1998, Milk & Milk Product Amendment Regulations – 2009

Part- 2 Food Safety and Standards Authority of India (FSSAI)

Repealed Acts / Orders and other live standards / Acts

Part- 3 Global Scenario

Codex Alimentarius Commission (CAC), CAC: Implications, Other International Standards Setting Bodies

Part 4 Export & Import Laws and Regulations

FTDR Act, 1992 and Foreign Trade Policy, Export (Quality Control and Inspection) Act, 1963, Export Related Regulations and Standards Set by Export Promotion Bodies, Plant and Animal Quarantine, Customs Act and Import Control Regulations

Part- 5 Other Laws and Standards Related to Food

Other Laws Related to Food Products, Voluntary National Standards: BIS and AGMARK, National Agencies for Implementation of International Food Laws and Standards, Accreditation System for Conformity Assessment Bodies

Text Books

- The training manual for Food Safety Regulators. Vol.II- Food Safety regulations and food safety management. (2011) Food safety and Standards Authority of India. New Delhi
- Mortimre, S., and Wallace, C., (2005) HACCP: A practical approach, 2nd Ed, Aspen Publication
- Surak, J.G., and Wilson, S. (2007) American Society for Quality, 2nd Ed., Quality Press

PGDFSMR103 : PRINCIPLES OF FOOD SAFETY AND QUALITY MANAGEMENT

(4+0: Theory)

Part-1 Fundamentals of Food Microbiology

Introduction to Food Safety, Food Safety System, Total Quality Management, Project Management

Part- 2 Analytical Techniques in Microbiology

An Introduction to Risk Analysis, Risk Management, Risk Analysis, Risk communication

Part- 3 HACCP

History, Background and Structure, Pre-requisites, Principles, Case studies

Part- 4 Other Food Safety Practices

Good Agriculture Practices, Good Animal Husbandry Practices /Good Manufacturing Practices / Good Hygiene practice / Good Distribution Practice, Good Retail Practices, Good Transport Practices and Nutrition Labelling, Traceability Studies

Text Book

- Gazette of Food Safety and Standards Act, (2006) Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi
- The training manual for Food Safety Regulators. (2011) Vol.III, Food Safety regulations and food safety management. Food Safety and Standards Authority of India. New Delhi.

PGDFSMR104 : QUALITY ASSURANCE IN FOOD LABORATORIES

(4+0: Theory)

Part- 1 Food Laboratories

Accreditation of food laboratory, referral laboratories, functions of food analysts, hierarchy of food safety authorities, analysis of food samples and reports, other regulatory provisions pertaining to analysis of food

Part- 2 Validation of analytical methods:

Good Laboratory Practices (GLP)- history of GLP, areas of application, facilities, test systems, test and reference items, Standard Operating Procedure (SOP), study performance and reporting.

Part- 3 Analytical method used for quality determination:

Chemical and physical, microbiological, biochemical and sensory analysis.

Part- 4 Analytical methods of determination of basic food components:

Protein, saccharides, lipids, vitamins, water, minerals and trace elements, sensory active compounds, anti-nutritive and natural toxic compounds, food additives and food contaminants.

Part- 5 Advanced laboratory techniques:

Principle, working and application of GC, HPLC, HPTLC, LC/MS, inductively coupled Plasma Mass Spectroscopy and PCR, real time PCR, ELISA, Triple Quadrapole system.

Text books

- Luning, Pieternel A., Willem J. Marcelis, and Wim MF Jongen. *Food quality management: a techno-managerial approach*. WageningenPers, 2002.
- Funk, Werner, Vera Dammann, and GerhildDonnevert. *Quality assurance in analytical chemistry: applications in environmental, food and materials analysis, biotechnology, and medical engineering*. John Wiley & Sons, 2007.
- Tothill, I., ed. *Rapid and on-line instrumentation for food quality assurance*. Elsevier, 2003.

PGDFSMR105 : FOOD SAFETY AND QUALITY MANAGEMENT SYSTEMS

(4+0: Theory)

Part-1 Management Systems, Auditing and Accreditation

Introduction to Management Systems, Standard and Accreditation, ISO 9001 , ISO 9001 : 2015 – An Overview, ISO 9001 : 2015 – Structure, Clause –wise Interpretation of ISO 90001 : 2015, ISO 9001 : 2015 –Case Studies, ISO 22000: 20015, ISO 22000: 2005 – An Overview, Clause –wise Interpretation ISO 22000: 2005, ISO 22000: 2005- Case Studies

Part- 2 Laboratory Quality Management System

An Overview and Requirements of ISO 17025, Requirements Specific to Food Testing Laboratories – Physical and Chemical Parameters, Requirements Specific to Food Testing Laboratories-Biological Parameters, General Topics: Related to Food Testing Laboratories

Part- 3 Retailer Standards

BRC Food and BRC IOP Standards: An Overview, International Food standards (IFS), SQF

Text books

- Barendsz, A. W. "Food safety and total quality management." *Food Control* 9.2 (1998): 163-170.
- Spears, Marian C. *Foodservice organizations: A managerial and systems approach*. 1995.
- Akkerman, Renzo, PooryaFarahani, and Martin Grunow. "Quality, safety and sustainability in food distribution: a review of quantitative operations management approaches and challenges." *Or Spectrum* 32.4 (2010): 863-904.
- Henson, Spencer, and Julie Caswell. "Food safety regulation: an overview of contemporary issues." *Food policy* 24.6 (1999): 589-603.

PGDFSMR106 :CHEMICAL AND MICROBIOLOGICAL SAFETY OF FOODS

(4+0: Theory)

Part 1 :Chemical contaminants

Pesticides and veterinary drugs: Detection and quantification of carbamates, organochlorine and organosuplhur, organohalogens, nitrites, herbicides, hormones, antibiotics, steroids, environmental chemicals - heavy metals, toxic residues, radioactive isotopes. Processing contaminants: Detection, quantification and health hazards of direct contaminants – acrylamide, PAHs, oxyhalides, and haloacetic acids, preservatives,

flavor enhancers, color additives. Food additives colorants and sweeteners : Detection, quantification and health hazards, Emulsifiers, stabilizers, thickening and gelling agents:

Part 2: Protection and preservation of foods:

Hurdle technology, chemical, modified atmosphere, irradiation, thermal and non thermal techniques.

Part 3 : Food borne diseases:

Importance and significance of microorganisms in food safety, Intrinsic and extrinsic factors affecting the growth of micro organisms in food. characteristics and incidence of Food borne diseases - global and Indian scenario, food poisoning and food intoxications of microbial origin, bacterial food borne diseases; viral food borne diseases; protozoa animal parasite food borne diseases; mycotoxicoses; mushroom poisoning; investigation and management of food borne diseases.

Part 4 : Food spoilage:

Characteristic features, dynamics and significance of spoilage of different groups of foods - cereal and cereal products, vegetables and fruits, meat poultry and sea foods, milk and milk products, packed and canned foods.

Part 5 : Determination of micro organisms and their products in food:

Sampling, sample collection, transport and storage, sample preparation for analysis. microscopic and culture dependent methods- direct microscopic observation, culture enumeration and isolation methods ; culture independent techniques – PCR Based, DGGE, metagenomics, etc.; chemical, physical, immunological methods for microbial metabolites- microbial metabolites.

Part- 5 Microbiological techniques:

Collection of food samples – sampling, collection, transport and storage. Enumeration of microorganisms: Direct count, Total aerobic count, Selective media. Identification of pathogenic microorganisms – Selective media, PCR based identification, ELISA . Isolation and identification of virulent E. coli from foods. Detection of microbial metabolites- HPTLC, HPLC, ELISA; Bacterial toxins: Ceralides, E coli Toxins ; Mycotoxins: Aflatoxins, Trichotheenes

Text books

- Pelczar, M.I., and Reid, R.D. (2009) Microbiology, 5th Ed., McGraw Hill Inc., New York.

- James, M.J. (2007) Modern Food Microbiology, 2nd Ed., CBS Publisher, New Delhi
- Adams, M.R., and Moss, M.G., (2005) Food Microbiology, 1st Ed., New Age International (P) Ltd., New Delhi.
- Frazier, W.C. (2008) Food Microbiology, 4th Ed., McGraw Hill Inc., New York.
- Doyle, P., Bonehat, L.R. and Mantville, T.J. (2007) Food Microbiology, Fundamentals and Frontiers, ASM Press, Washington DC.

PGDFSMR 107: FOOD SAFETY, QULAITY CONTROL AND QUALITY AUDITING (PRACTICALS)

(0+4: Practicals)

I. CHEMISTRY PRACTICALS

1. Calibration of pipettes, scales and dispensers
2. Calibration of selected equipments
3. Equipment Maintenance, record keeping and reporting of results
4. Estimation of proximates from food samples
5. Estimation of vitamins from food samples
6. Estimation of minerals from food samples
7. Estimation of trace elements from food samples
8. Estimation of mycotoxins from food samples

II. MICROBIOLOGY PRACTICALS

1. Collection of food samples – sampling, collection, transport and storage
2. Enumeration of microorganisms:
    a. Direct count
    b. Total aerobic count
    c. Selective media
3. Identification of pathogenic microorganisms
    a. Selective media
    b. PCR based identification
    c. ELISA
4. Detection of microbial metabolites: HPTLC, HPLC, ELISA
    a. Bacterial toxins: Ceralides, *E Coli* Toxins
    b. Mycotoxins: Aflatoxins, Trichotheenes
    c. Histamine

5. Isolation and identification of virulent *E. Coli* from foods
6. Investigation of suspected food borne disease outbreak

III. QULAITY CONTROL AND QUALITY AUDITING

1. Development of GHP and GMP Plan for a food outlet.
3. Development of GHP and GMP Plan for a food factory
4. Development of FSMS
5. Application of ISO 9001 Model
6. Food Laws: Identification of legal requirements for following food groups product standards:
7. Food Retail management– basis requirements
8. Establishing Traceability to national/international standards:
9. Auditing: Planning, Execution & Reporting

PGDFSMR108. CASE STUDY / PROJECT AND REPORT

(0+4: Project)

The project could be undertaken in establishments like: diagnostic/Testing labs, Research institutions, Manufacturing, Hospitality, Retail and Street food hawkers. The suggestive lists of topics are as follows.

- Food quality control and testing
- Food diagnostics methods
- Food Safety Regulations in Manufacturing Sector
- Food Safety in Retail Sector and in Catering Sector
- HACCP and Food Safety Auditing